Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 16, 2010 has been entered.

Response to Amendment

Amendment filed on April 16, 2010 has been entered. Claims 3-5, 7, 9, 10, 12, 14, 15 and 20-22 are pending in the application.

Claims examined on the merits are 3-5, 7, 9, 10, 12, 14, 15 and 20-22.

Examiner Note

1. A phrase "initial *thin* nickel film" was interpreted by the Examiner according to the specification as originally filed as a film having thickness within a range of 0.001-2 microns (See published Application, P31).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 3-5, 7, 9, 10, 12, 14, 15 and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakami et al (JP 1-242782).

Kawakami et al is applied here for the same reasons as set forth in paragraph 5 of the Office Action mailed on 5/15/2009.

As to uniform and smooth surface of a thin nickel film after step (II) and homogeneous and continuous nickel film after step (III),

Kawakami et al teaches that a nickel film obtained by electroless plating on catalysed core particles has **uniform and smooth** surface (See page 24, last paragraph), as required by Amendment.

Moreover, Kawakami et al teaches that a mixture of 86ml of nickel sulfate solution **a** of 224g/l (1.22 moles/l) and 86ml of a reducing sodium hypophosphite solution of 226 g/l (3.04 moles/l) (i.e. their mixture will have **0.61moles/l** (half of 1.22moles/l) of *nickel ions* and **1.52 moles/l** (half of 3.04moles/l) of a *reducing agent)*, are added to the suspension of *core particles* (See Table 5 and page 23, last paragraph) in the range of **20-300 g/l** (See page 17, first paragraph) containing a *complexing agent* such that a final nickel plating mixture has complexing agent preferably in the range of 5-50g/l (See page 18, first paragraph), e.g. *tartaric acid* in an amount of 10g/l (**0.0067 moles/l**), *glycine* in an amount of 20g/l (**0.27 moles/l**), or *ethylenediamine* in an amount of 5g/l (**0.08 moles/l**) as disclosed in Table 4.

In other words, the first nickel plating solution of Kawakami et al has:

core particles 20 - 300 g/l;

nickel ions 0.61 moles/l;

reducing agent 1.52 moles/l;

complexing agent (tartaric acid, glycine or ethylenediamine) 0.0067 – 0.27 moles/l.

Note that the Applicants' first nickel plating solution has:

core particles 0.1 - 500 g/l (See P34 of Published Application);

nickel ions $2.0x10^{-4}$ -1.0 moles/l (See P32 of Published Application;

reducing agent $4.0x10^{-4}$ -2.0 moles/l (See P32 of Published Application);

complexing agent (tartaric acid, glycine or ethylenediamine) 0.003 – 10 moles/l (See P33 of Published Application).

Thus, a first nickel plating solution of Kawakami et al is or would be substantially identical to that disclosed in the Applicants' specification. Therefore, the first nickel film prepared according to Kawakami et al would have columnar structure (especially when glycine or ethylenediamine is used as a complexing agent) because the Applicants' specification discloses that at conditions of nickel plating of Kawakami et al, the nickel film of columnar structure is easily formed (See P33 of Published Application).

It is the Examiner's position that the step (ii) in Kawakami et al would achieve a plated nickel film having uniform and smooth surface as required by Amendment; and the repetition of step (ii) (i.e. claimed step (III)) in Kawakami et al achieves homogeneous and continuous nickel film including columnar structures extending in a direction of thickness of a nickel film, as required by Amendment, since it would be formed by a process substantially identical to that of claimed invention.

4. Claims 3-5, 7, 9, 10, 12, 14, 15 and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakami et al '782, as applied above, further in view of Kaneyoshi (US 20010055685) for the reasons of record set forth in paragraph 6 of the Office Action mailed on 5/15/2009.

5. Claims 3-5, 7, 9, 10, 12, 14, 15 and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakami et al '782 or Kawakami et al '782 in view of Kaneyoshi '685, as applied above, and further in view of Svendsen et al (US 5262718) for the reasons of record set forth in paragraph 7 of the Office Action mailed on 5/15/2009.

6. Claims 3-5, 7, 9, 10, 12, 14, 15 and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakami et al '782 or Kawakami et al '782 in view of Kaneyoshi '685 or over Kawakami et al '782 in view of Svendsen et al or Kawakami et al '782 in view of Kaneyoshi '685, further in view of Svendsen et al, as applied above, and further in view of Weber et al (US 6,274,241) for the reasons of record set forth in paragraph 4 of the Office Action mailed on 8/25/2008.

7. Claims 3-5, 7, 9, 10, 12, 14, 15 and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over the cited prior art, as applied above, as applied above, and

further in view of Segawa et al (JP 2001-316834) for the reasons of record set forth in paragraph 5 of the Office Action mailed on 8/25/2008.

Declaration of Mr. Shinji Abe under 37 CFR 1.132

The Declaration of Mr. Shinji Abe under 37 CFR 1.132 filed on April 16, 2010 is insufficient to overcome the rejection of claims 3, 5, 7, and 9-34 based upon primary reference of JP 1-242782 to Kawakami et al as set forth in the last Office action because the conditions of experiments conducted by Mr. Shinji Abe are not disclosed. The Applicants' specification discloses that the *concentration* of the complexing agent ***affects*** the formation of the nickel film having ***columnar*** structures; the amount of the complexing agent in the initial thin film-forming solution should be preferably **0.003 to 10 moles/l** and more preferably 0.006 to 4 moles/l. Among these complexing agents, ***glycine or ethylenediamine*** is preferably used because it is possible to easily form a nickel film having columnar structures. (See P33 of Published Application). In other words, the Applicants' specification discloses that the presence of a **complexing agent** especially *glycine or ethylenediamine* in an amount of 0.003 to 10 moles/l is ***critical*** for achieving **columnar structures**. The Applicants' first nickel plating solution has core particles in an amount of 0.1 - 500 g/l (See P34 of Published Application), nickel ions in an amount of $2.0x10^{-4}$ -1.0 moles/l (See P32 of Published Application, a reducing agent in an amount of $4.0x10^{-4}$ -2.0 moles/l (See P32 of Published Application), and a complexing agent (tartaric acid, glycine or ethylenediamine) in an amount of 0.003 - 10 moles/l (See P33 of Published Application).

However, the Declaration of Mr. Shinji Abe is silent about concentration of all components of a nickel plating solution including critically important amount of a complexing agent.

Kawakami et al teaches that a mixture of 86ml of nickel sulfate solution **a** of 224g/l (1.22 moles/l) and 86ml of a reducing sodium hypophosphite solution of 226 g/l (3.04 moles/l) (i.e. their mixture will have **0.61moles/l** (half of 1.22moles/l) of *nickel ions* and **1.52 moles/l** (half of 3.04moles/l) of a *reducing agent)*, are added to the suspension of *core particles* (See Table 5 and page 23, last paragraph) in the range of

20-300 g/l (See page 17, first paragraph) containing a *complexing agent* such that a final nickel plating mixture has complexing agent preferably in the range of 5-50g/l (See page 18, first paragraph), e.g. *tartaric acid* in an amount of 10g/l (**0.0067 moles/l**), *glycine* in an amount of 20g/l (**0.27 moles/l**), or *ethylenediamine* in an amount of 5g/l (**0.08 moles/l**) as disclosed in Table 4.

The first nickel plating solution of Kawakami et al has:

core particles 20 - 300 g/l;

nickel ions 0.61 moles/l;

reducing agent 1.52 moles/l;

complexing agent (tartaric acid, glycine or ethylenediamine) 0.0067 – 0.27 moles/l.

The Applicants' first nickel plating solution has:

core particles 0.1 - 500 g/l (See P34 of Published Application);

nickel ions $2.0x10^{-4}$ -1.0 moles/l (See P32 of Published Application;

reducing agent $4.0x10^{-4}$ -2.0 moles/l (See P32 of Published Application);

complexing agent (tartaric acid, glycine or ethylenediamine) 0.003 – 10 moles/l (See P33 of Published Application).

Thus, a first nickel plating solution of Kawakami et al is substantially identical to that disclosed in the Applicants' specification. Therefore, the first nickel film prepared according to Kawakami et al would have columnar structure especially when glycine or ethylenediamine is used as a complexing agent because the Applicants' specification discloses that at conditions of nickel plating of Kawakami et al, the nickel film of columnar structure is easily formed.

Response to Arguments

Applicant's arguments filed April 16, 2010 have been fully considered but they are not persuasive.

Applicants traverse the rejections over Kawakami et al., Kaneyoshi, Svendsen et al., Weber et al. and Segawa et al. in view of the enclosed Declaration under 37 CFR 1.132 showing the differences with the prior art to Kawakami et al. Applicants respectfully submit that the Declaration under 1.132 submitted with this amendment

proves that even though the method of second step (electroless plating treatment) in Kawakami et al. was repeated after the first step (catalyzing treatment) and the second step (electroless plating treatment) of Kawakami et al. as the Examiner discussed in the office action, columnar structures extending in a direction of the thickness of the nickel film were not observed as shown in Fig. 1 of the SEM picture attached with the declaration. Fig. 1 of the SEM picture in the declaration shows the upper nickel film layer and the lower nickel film layer. The upper nickel film layer and the lower nickel film layer have different colors as shown in the picture. The lower nickel film layer was produced by the first electroless plating treatment. The upper nickel film layer was produced by the second electroless plating treatment. As a result of this experiment, columnar structures extending in a direction of the thickness of the nickel film were not observed when the second step of Kawakami et al. was repeated over the first plated nickel film layer. On the other hand, the method of the present invention has the initial thin film formation step (the claimed step II) for uniformly and smoothly forming an initial thin nickel film, and the electroless plating step (the claimed step III) for performing electroless plating because the present invention intends to make a homogeneous and continuous nickel film including columnar structures extending in a direction of a thickness of the nickel film (not controlling the desired thickness of the final coating as discussed by the Examiner).

The Examiner respectfully disagrees with this argument. The Declaration of Mr. Shinji Abe under 37 CFR 1.132 filed on April 16, 2010 is insufficient to overcome the rejection of claims 3-5, 7, 9, 10, 12, 14, 15 and 20-22 based upon primary reference of JP 1-242782 to Kawakami et al as set forth in the last Office action because the conditions of experiments conducted by Mr. Shinji Abe are not disclosed. (See above).

All other Applicants' arguments were discussed in detail by the Examiner in the Final Office Action mailed on 5/15/2009 and in the Advisory Action mailed on 8/24/2009. Note that Appeal conferees agreed with the Examiner that claimed invention would have been obvious over the cited prior art. (See Notice of Panel Decision from Pre-Appeal Brief Review mailed on 10/7/2009).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ELENA Tsoy LIGHTFOOT whose telephone number is (571)272-1429. The examiner can normally be reached on Monday-Friday, 9:00AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Primary Examiner
Art Unit 1715

June 16, 2010

/Elena Tsoy Lightfoot/